

## DIET COMPARISON BETWEEN FLEDGLING AND ADULT TAWNY OWL *STRIX ALUCO* LINNÉ, 1758 (AVES; STRIGIDAE) IN SUBURBAN AREA OF EL HARRACH (ALGIERS, ALGERIA)

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### ABSTRACT

The diet of Tawny owl was realized in a suburban area in garden park of El Harrach (Northeast of Algiers). The diet was determined by analyzing of 66 pellets of adult and 52 pellets of fledgling in Garden park of El Harrach during 1999. Our study showed that birds made up the most consumed prey (49.5 %). These were followed by Amphibian (14.6 %), rodents (14.5 %), arthropods (14.1 %), reptiles (6.4 %), and Chiroptera (0.9 %). The dominant species in the diet was Hybrid Sparrow *Passer domesticus* x *Passer hispaniolensis* making up 23.2%. The results of the diet of fledgling Tawny owl showed that birds were the most important component with 44.3 %. These were followed by Insects (29.3%), Amphibians (9.0 %), Reptiles (8.4 %), Insectivora (3.0 %) and Chiroptera (2.4 %). In the same the most dominant species was the hybrid sparrow with 15.6 %.

**KEYWORDS:** Diet Comparison, Fledgling, Adult, Tawny owl, Suburban, El Harrach

### INTRODUCTION

In Europe, Tawny owl *Strix aluco* was subject of several works relating to the diet, behaviour and breeding, we can quote works of Guerin (1932), Southern (1969), Cheylon (1971), Delmee et al. (1979), Wendlend (1984), Baudvin (1991), Galiotti (2001) and Roulin et al. (2008). However few information exists relating to trophic menu's composition of fledgling *Strix aluco* (Guerin, 1932; Ellen, 1991; Nocturnes, 1991). Interest presented by nocturnal bird of prey notably Tawny owl, is highlighted. Diet's Tawny owl is closely connected to biotope nature in which it frequents. It varies according to environment diversity and supplying of preys living in. (Delmee et al. 1979). Opportunist behaviour of this bird of prey offers in this way to naturalist researchers, fauna inventory of the studied region. In Algeria, Tawny owl's diet has been regularly observed during several years in gardens park of El Harrach (Saadi, 1994, Doumandji et al. 1994, 1997; Tergou et al. 1997; Neffah, 1997, Sakhri, 1997; Idouhar-Saadi, 2002). In Tizi Ouzou area, Tawny owl's diet has been approached by Hadjarab (1997) and Hamdine et al. (1999). Nevertheless; diet of this predatory remains unknown in other territory regions, likewise ethological and bi-ecological aspects of these species are bad-known in Algeria. The present work comes to achieve performed studied already realized in the garden park of El Harrach. It aims among others, to bring information on dietary structure of fledgling tawny owl in suburban environment at El Harrach during breeding period.

## STUDY AREA

The study was conducted in the suburb of El Harrach between Belfort (Hacen Badi) and the eastern part of Mitidja (03° 08' E, 36° 43' N). The study area was 50 m a.s.l., with 10ha of buildings, parks and lawns and 6ha of agri-cultural plots. The climate in this region is Mediterranean, with temperatures influenced by the proximity of the sea. The average annual rainfall is 622mm, but 807mm was recorded during the study period of 1999. The daily temperature ranged from a mean minimum of 13.5°C to a mean maximum of 25°C in 1999.



Figure 1: Location of Study Area

## MATERIALS AND METHODS

The diet was determined by pellets analysis. The pellets were collected every day during a breeding period of Tawny owl in 1999. Under each roost used by Tawny owl, the collect of pellets was realized. The perches examined were *Pinus pinea*, *Pirus halepensis*, *Eucalyptus citriodora*, *Fraxinus berlandieri*, *Morus nigra* and *Quercus faginea*. During this study, we have collected 52 pellets of fledgling Tawny owl and 66 pellets from adults during June and July 1999. Each pellet was dissected in water (Guerin, 1928). Mammalian prey items were identified from their skulls and dental characteristics. Avian prey items were identified from the remains of the following parts: beak, humerus, femur and tibia as well as feathers, using the reference collection of the Department of Zoology of the Agronomic National Institute at El Harrach. Arthropoda were identified from various remains, including heads, mandibles, anten-nae, legs and especially elytrae. Arthropoda prey were identified to genus, or genus and species, using the Pasquier and Maurel insect collections of the Department of Zoology of the Agronomic National Institute. The number of vertebrates was calculated on the basis of the predominant bone elements, jaw bones or skulls for mammalian species, and on beaks or humerus bones for birds. Arthropoda were counted from the number of legs, heads, elytrae, mandibles and ovipositor valves.

Two ecological indices were calculated:

The relative frequency (R.F. %): the number of individuals of a species per total number of the individuals of all species;

The relative biomass (B%): the mass of the individuals of a prey species as a percentage of the total mass of prey. The comparison between diet of fledgling and adult Tawny owl is made owing to use of Sorenson similarity index, to see similitude level of both menus. Similarity quotient of Sorenson is calculated by following formula: (Sorenson, 1948).

$$O_s = \frac{2 C}{(a + b)} \times 100$$

**a** is number of present species in the environment A

**b** is number of present species in the environment B

**c** is number of common species to two environment A and B

## RESULTS

### Relative Frequency of Prey Species of Tawny Owl

Preys items were grouped into six major categories in the diet of adult Tawny owl in garden park of El Harrach area. Birds were the most consume prey with 49.6%. Amphibians (14.6%), Arthropoda (14.6 %), Rodents (14.5 %) and Chiroptera (0.9 %) made up the remainder of the diet (Table 1). The dominant species in the diet was the hybrid sparrow *Passer domesticus* x *Passer hispaniolensis* with 51 individuals (23.2 %). This was followed by *Discoglossus pictus* (14.6 %), *Rattus norvegicus* (11.8 %), *Carduelis chloris* (11.4 %), *Tarentola mauritanica* (6.4 %) and *Streptopelia turtur* (5.5 %). The other species prey made up less than 1.5 % in the diet of adults Tawny owl.

**Table 1: Relative Frequency (R.F. %) and Biomass (B %) of Preys of Adults and Fledglings *Strix aluco* in Garden Park of El Harrach during Breeding Season in 1999**

Species Prey	Adults			Fledgling		
	n	R.F.%	B%	n	R.F. %	B%
<i>Dysdera</i> sp.	7	3.18	0.01	-	-	-
<i>Dysderidae</i> sp. und.	3	1.36	0.00	-	-	-
<i>Aechnidae</i> sp. und.	1	0.45	0.02	-	-	-
<i>Periplaneta americana</i>	3	1.36	0.03	8	4.79	0.21
<i>Mantis religiosa</i>	-	-	-	1	0.60	0.04
<i>Gryllus bimaculatus</i>	4	1.82	0.03	2	1.20	0.04
<i>Gryllidae</i> sp. und.	2	0.91	0.01	-	-	-
<i>Pamphagus elephas</i>	1	0.45	0.30	-	-	-
<i>Anagridium aegyptium</i>	2	0.91	0.08	1	0.60	0.10
<i>Acrida turrita</i>	1	0.45	0.01	-	-	-
<i>Caelifera</i> sp. und.	-	-	-	1	0.60	0.01
<i>Forficula auricularia</i>	-	-	-	4	2.40	0.01
<i>Dermoptera</i> sp. und.	-	-	-	2	1.20	*
<i>Cicadetta montana</i>	-	-	-	1	0.60	*
<i>Tettigia orni</i>	-	-	-	19	11.38	0.37
<i>Ocypus olens</i>	1	0.45	*	-	-	-
<i>Acinopus megacephalus</i>	1	0.45	0.01	-	-	-
<i>Amphimallon scutellare</i>	-	-	-	5	2.99	0.02
<i>Cermbycidae</i> sp. und.	-	-	-	3	1.80	0.06
<i>Potosia cuprea</i>	1	0.45	0.01	-	-	-
<i>Hymenoptera</i> sp. und.	1	0.45	*	-	-	-
<i>Lepidoptera</i> sp. und.	1	0.45	*	1	0.60	*
<i>Noctuidae</i> sp. und.	2	0.91	0.01	1	0.60	0.02
<i>Discoglossus pictus</i>	32	14.55	5.90	15	8.98	6.66
<i>Tarentola mauritanica</i>	14	6.36	1.24	14	8.38	2.99
<i>Streptopelia turtur</i>	12	5.45	20.50	6	3.59	24.67
<i>Apus pallidus</i>	3	1.36	1.80	2	1.20	2.89
<i>Delichon urbica</i>	2	0.91	0.52	1	0.60	0.62
<i>Pycnonotus barbarus</i>	2	0.91	1.16	3	1.80	4.19
<i>Sylvia atricapilla</i>	7	3.18	1.91	3	1.80	1.97
<i>Sylvidae</i> sp. und.	1	0.45	0.25	1	0.60	0.59
<i>Phylloscopus</i> sp.	3	1.36	0.18	4	2.40	0.71
<i>Muscicapa striata</i>	-	-	-	2	1.20	1.05
<i>Parus major</i>	1	0.45	0.27	-	-	-

**Table 1: Contd.,**

<i>Cyanites tenerifae</i>	1	0.45	0.14	-	-	-
<i>Carduelis chloris</i>	25	11.36	8.71	20	11.98	16.78
<i>Serinus serinus</i>	1	0.45	0.15	6	3.59	2.23
<i>Passer domesticus x P. hispaniolensis</i>	51	23.18	18.33	26	15.57	22.49
<i>Rattus norvegicus</i>	26	11.82	35.54	2	1.20	6.58
<i>Rattus rattus</i>	1	0.45	1.37	-	-	-
<i>Mus musculus</i>	3	1.36	0.78	3	1.80	1.87
<i>Mus spretus</i>	2	0.91	0.52	1	0.60	0.62
<i>Crossidura russula</i>	-	-	-	4	2.40	1.32
<i>Suncus etruscus</i>	-	-	-	1	0.60	0.07
<i>Pipistrellus kuhlii</i>	2	0.91	0.16	2	1.20	0.39
Chiroptera sp. und.	-	-	-	2	1.20	0.39
Total	<b>220</b>	100	100	<b>167</b>	100	100
Shannon diversity index			3.5		4.24	
Equitability			0.69		0.84	

n: number of individual, -: species absent, \*: Biomass < 0.01; sp. und.: species undetermined

However, the diet of fledgling Tawny owl was composed by seven categories (Table 1). Birds were dominant in the diet (44.3 %), followed by Insects (29.3 %), Amphibians (9.0 %), reptiles (8.4 %), Rodents (7.2 %), Insectivora (3.0 %) and Chiroptera (2.4 %). The hybrid sparrow *Passer domesticus x P. hispaniolensis* was the dominant species eaten (15.6 %). This was followed by the *Carduelis chloris* (12.0 %), *Tettigia orni* (11.4%), *Discoglossus pictus* (9.0 %) and *Tarentola mauritanica* (8.4 %). The other species prey, their frequencies vary between 0.6 % and 3.6 %.

### Biomass of Prey Species of Tawny Owl

Based on biomass, *Rattus norvegicus* (35.5 %) was the most profitable prey in biomass according to others preys-species captured by Tawny owl. This was followed by *Streptopelia turtur* (20.5 %), *Passer domesticus x P. hispaniolensis* (18.3 %), *Carduelis chloris* (8.7 %) and *Discoglossus pictus* (5.9 %), with all the other prey species comprising less than 2% of the samples. As for fledgling, *Streptopelia turtur* was the most numerous in biomass (24.7 %). This was followed by *Passer domesticus x P. hispaniolensis* (22.5 %), *Carduelis chloris* (16.8 %). The other rates were weakly represented, varied between 0 and 6.7 % (Table 1).

### Diet Similarity between Fledglings and Adults Tawny Owl

The Sorenson's similarity index concerning consumed preys by adults and fledglings Tawny owl during period from June to July 1999 reveals a rate of 62.69 %. This value showed a relatively similarity of the diet between fledglings and adults Tawny owl.

## DISCUSSIONS

### Relative Frequency of Prey Species of Tawny Owl

Preys items were grouped into six major categories in the diet of adult Tawny owl in garden park of El Harrach area. Birds were the most consume prey with 49.6%. Amphibians (14.6%), Arthropoda (14.6 %), Rodents (14.5 %) and Chiroptera (0.9 %) made up the remainder of the diet. Similar work was performed by Zalewski (1994), in Poland in urban environment during chicks nourishing; shows that birds occupy the first place (66.1 %) in Tawny owl's diet, followed by mammals (31.4 %) and by amphibians (2.5 %). In the other hand, in suburban environment, mammals are having higher rate of 52.0 %, followed by amphibians (30.0%) and by birds (18%). According to the same author, in urban environment and after young's taking off, menu of *Strix aluco* was essentially constituted by birds (74.5 %), mammals

(23.5%) and amphibians (2.0%), and in suburban environment, mammals were most ingested (56.7 %), this was followed by amphibians (23.3 %) and birds (20.0 %). However, the diet of fledgling Tawny owl was composed by seven categories (Table 1). Birds were dominant in the diet (44.3 %), followed by Insects (29.3 %), Amphibians (9.0 %), reptiles (8.4 %), Rodents (7.2 %), Insectivora (3.0 %) and Chiroptera (2.4 %). The hybrid sparrow *Passer domesticus* x *P. hispaniolensis* was the dominant species eaten (15.6 %). This was followed by the *Carduelis chloris* (12.0 %), *Tettigia orni* (11.4%), *Discoglossus pictus* (9.0 %) and *Tarentola mauritanica* (8.4 %). Guerin (1932) reported that the diet of fledglings Tawny owl in the nest in Vendee area was based on birds (*Erythacus rubecula* and *Turdus merula*) and Rodents (*Apodemus sylvaticus*, *Rattus rattus* and *Evotomys glareolus*). Ellen and Broecke (1991) mentioned in the North of Netherlands that the diet of fledglings of *Strix aluco* was based on rodents, such as field mouse, mice and frogs. Baudvin and Dossolin (1987) reported that the diet of nestlings Tawny owl in the forest of Citeaux in Cote d'Or (France) was composed by voles (33.3 %) and field-mouse (49.0 %). This was followed by frogs (8.1 %), earthworms (3.3 %) and birds (0.9 %).

### Biomass of Prey Species of Tawny Owl

The relative biomass of the species prey in the diet of adults Tawny owl showed that *Rattus norvegicus* (35.5 %) was the most profitable prey in biomass according to others preys-species captured by Tawny owl. This was followed by *Streptopelia turtur* (20.5 %), *Passer domesticus* x *P. hispaniolensis* (18.3 %), *Carduelis chloris* (8.7 %) and *Discoglossus pictus* (5.9 %). On the other hand, Hamdine et al. (1999) reported that the rodents were consumed by 50.6% of biomass in suburban area of El Harrach and 65.2 % in farmland area near Boukhalfa. According to the same authors, the biomass of ingested birds by *Strix aluco* at El Harrach is 39.4 % whose the hybrid sparrow making up 16.0 %. In the other hand, in farmland area at Boukhalfa, birds biomass is only equal to 10.9 %, the Hybrid sparrow was presented by 3.6 %. In Torun city (Central Poland), during the breeding period, Tawny owl *Strix aluco* consumes 30.9 % of biomass of *Passer domesticus* (Zalewski, 1994). The same author reported that in the outskirts city in suburban area, the percentage of ingested domestic sparrows is lower (4.2 %). Zalewski (1994) showed that the diet of Tawny owl in Torun city in Poland (suburban area) was composed by amphibians prey such as *Rana* sp. with 36.1% of biomass. This percentage falls in urban area reaching 2.4 %. As for fledgling, *Streptopelia turtur* was the most numerous in biomass (24.7 %). This was followed by *Passer domesticus* x *P. hispaniolensis* (22.5 %), *Carduelis chloris* (16.8 %). In other hand, in the Netherlands Ellen (1991), reported that the fledgling Tawny owl ingest small rodents with 91 % of biomass.

### Diet Similarity between Fledglings and Adults Tawny Owl

This value of Sorenson's similarity index showed a relatively similarity of the diet between fledglings and adults Tawny owl. Effectively, Roulin et al. (2008) showed during the breeding season of Tawny owl that the diet was dominated by rodents, such as field-mouse *Apodemus* sp. (65 %) and reddish-vole *Clethrionomys glareolus* (21.4 %). According to the same authors, after the breeding period, similar results were recorded concerning the diet of adults and fledgling Tawny owl which the field-mouse (33.4 %) and reddish-vole (27.9 %) were the most consumed prey.

## CONCLUSIONS

The analysis of pellets of adults Tawny owl in garden park of El Harrach reveals that hybrid sparrow *Passer domesticus* x *P. hispaniolensis* was the most species consumed (23.3 %). In the same, the fledglings *Strix aluco* diet was composed by hybrid sparrow (15.6 %). Based on biomass, *Rattus norvegicus* was the most profitable prey in the adults diet

(35.4%). As for fledglings diet, the highest rate of biomass was *Streptopelia turtur* (24.7 %) according to other preys-species consumed. It is to be mentioned a relatively similarity of the diet between fledglings and adults Tawny owl.

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